From Scott Matyac
5/5/97

BMP #16, Ultra–Low Flush Toilet Replacement Programs: Some agencies have vigorously implemented this practice in tandem with incentive programs. Water savings have been quantified and specific studies carried out to refine estimates.

The CUWCC has reviewed problems with implementation and quantification of the current BMPs, and has made its revision an element of a strategic plan developed in 1996.

Urban Water Management Plans

The Urban Water Management Planning Act of 1983 was amended in 1990, 1991, 1993, 1994 and 1995. The 1995 legislation established revisions that brought Division 6, Part 2.6 of the California Water Code up to date and modified some important declarations and policy statements, including:

Conservation and efficient use of urban water supplies are of statewide concern, however, the planning for that use and the implementation of those plans can best be accomplished at the local level;

As a part of its long–range planning activities, all urban water suppliers should attempt to ensure the appropriate level of reliability in their water service sufficient to meet the needs of various categories of customers during normal, dry and multiple dry water years; and

This act and its amendments established a process that required urban water suppliers with 3,000 or more connections, or that deliver over 3,000 af of water per year to prepare urban water management plans every 5 years beginning in 1985. The plans have evolved since they first were completed in 1985. The 1990 plans reflected improved coordination and implementation of water conservation programs.

In 1995 DWR developed a sample urban water management plan. The sample plan integrated the elements required in the amendments to the Water Code to December 31, 1995. A letter reminding agencies of the law's requirements and the sample plan was mailed in September of 1995. Almost 200 plans had been submitted to DWR by March 1997. These plans were from agencies representing almost 90 percent of all urban water deliveries. Table 4–2 shows the number of agencies affected by the law that submitted plans in each hydrologic region.

Table 4-__. 1995 Urban Water Management Plans

Hydrologic Region	Plans Expected	Plans Filed
North Coast	13	10
San Francisco Bay	60	46
Central Coast	28	11
South Coast	187	152
Sacramento River	35	31
San Joaquin River	29	8
Tulare Lake	22	12
North Lahontan	5	0
South Lahontan	12	9
Colorado River	13	4
Total	**394**	**187**

CALFED's Water Use Efficiency Program

Future urban water conservation activities will have a direct impact on diversions from the Bay–Delta estuary. CALFED and the Bay–Delta Advisory Council have agreed that a certain level of urban water use efficiency should be one of the common elements required for all proposed Delta alternatives. In order to develop a common program for water use efficiency, CALFED formed a Water Use Efficiency Work Group comprised of members of BDAC and some invited participants. The major elements of the proposed urban water use efficiency program included:

1. Requirements that urban water management plans be implemented more vigorously and that DWR should review and endorse those plans;

2. Revisions to the BMPs to make them more quantifiable;

3. Requirements that CUWCC certify BMP implementation by all agencies that are required to prepare urban water management plans;

The overall emphasis was to build on existing programs and support the voluntary nature of CUWCC. CALFED also needed assurances that the program would be implemented vigorously. For example, urban water agencies that choose not to implement the water use efficiency program could be excluded from water transfers or participating in certain loan and grant programs. In addition, CALFED suggested that SWRCB could be asked to pursue its obligations to investigate waste and unreasonable use more vigorously.

Some parts of CALFED's proposed program have already begun under other agencies. As previously noted, CUWCC had realized that the implementation and quantification of BMPs had

raised concerns and had developed a strategic plan in 1996. One of the plan's objectives was to evaluate the BMPs, and revise them as necessary, to make them easier to quantify. The revised BMPs should be presented to CUWCC by the summer of 1997.

Urban Water Management Plans

Urban Water Use Forecasts

Urban water use forecasting is an essential element of the California Water Plan. Reliable estimates of future water use which integrate the effects of socioeconomic change and water conservation measures will help ensure an adequate urban water supply for California residents. DWR conducted an urban water use study for Bulletin 160–98 to forecast change in per capita water use by year 2020 in each hydrologic region. The results were used to estimate the year 2020 urban applied water by hydrologic region and statewide.

Urban water use forecasting techniques relate future water use to expected changes in one or more factors known to influence water use. The various methods differ primarily in the number of explanatory variables and the presumed effect they have on water use. Early forecasting methods were relatively simple and relied solely on service area population to explain water use, assuming a direct relationship between population growth and applied water demand. Such methods can provide acceptable results over the short term, especially during periods of abundant water supply and steady economic growth. However, mid– to long–term forecast accuracy may decrease sharply due to changes in the variables that influence water use. Among these determining factors are change in the ratio of single to multifamily dwellings, climate, commercial and industrial growth, income, future water conservation actions, and water pricing. Although the price of water currently plays a small role in water use, it could become more important if water prices increase significantly. New water supplies will be relatively expensive, so understanding the interactions between price and water use is essential for meaningful forecasts of urban water use.

The Urban Water Use Study relates future water use to expected change in population, income, economic activity, water price, and conservation measures. The relationships between water use and these variables were determined on the basis of local water agency data, economic forecasts, and literature review. *Water conservation measures* as used in this study include urban Best Management Practices and post–1990 changes to federal and state plumbing fixture standards.

The general forecasting procedure for the Urban Water Use study was to (1) determine base year (1995) per capita water use, (2) estimate the effects of conservation measures and socioeconomic change on future water use for 20 major water service areas in California, and (3)

calculate forecast–year (2020) per capita water use by hydrologic region using the results of the service area forecasts.

1995 per capita water use. The 1995 level per capita water use was calculated for each detailed analysis unit . In the South Lahontan and Colorado River regions, analyses were done at the planning subarea level due to the relatively sparse population in those regions. The 1995 level per capita water use is based on the 1990 level, adjusted to account for permanent effects of urban BMPs and post–1990 changes to federal and state plumbing fixture standards. The most significant post–1990 change to the plumbing fixture standards is that all toilets for sale or installation in California must use no more than 1.6 gallons per flush, compared to 3.5 gallons or more per flush for old–style toilets. The 1.6 gallon toilets are commonly referred to as ultra–low flush toilets, or ULFTs. Per capita 1995 water use estimates also reflect broader data collection and evaluation efforts for various areas of the state. Table 4–___ compares the 1990 and 1995 level per capita water use by hydrologic region. The values in the table represent gross per–capita use, including water used for residential, commercial, industrial, and landscaping . Per capita water use varies by region reflecting differences in climate, socioeconomic conditions, and other factors.

Per capita water use forecast. Urban Water Use Study forecasts were based on three types of input data: (1) Actual values of base–year water and socioeconomic variables (2) forecasted values of socioeconomic variables for the year 2020, and (3) savings assumptions for each water conservation measure. Table 4–___ lists the menu of input variables that were specified for each water service area.

Table 4–___. Per capita Water Use by Hydrologic Region, 1990 and 1995 (in gallons per day)

Region	*1990 Base*	1995 Base
North Coast	263	255
San Francisco Bay	193	177
Central Coast	189	180
South Coast	211	208
Sacramento River	283	274
San Joaquin River	309	301
Tulare Lake	301	311
North Lahonton	421	409
South Lahonton	278	284
Colorado River	579	578
Statewide	230	224

Table 4–___. Urban Water Use Study Input Variables

Water Use
Water use by sector, base year
Single family
Multi–family
Commercial
Industrial
Landscape
Seasonal water use, base year
Socioeconomic
Population, base–year and forecast–year
Total population
Population by dwelling type
Persons per household by dwelling type
Group quarters population
Housing, base–year and forecast–year
Number of housing units by dwelling type
Growth rate of housing stock by dwelling type
Employment, base–year and forecast–year
Commercial
Industrial
Income, base–year and forecast year
Water price, base–year and forecast year

Historical urban water use data is from DWR's annual *Survey of Public Water System Statistics* and from urban water management plans prepared by local and regional water agencies. Base year socioeconomic data were obtained from a number of sources, including federal, state, regional, and local agencies. Socioeconomic forecasts were made by DWR based on studies done by the California Department of Finance, the U.S. Department of Commerce, regional government associations, and others. Table 4–x lists the primary sources of water use and socioeconomic information used as input for the Urban Water Use Study.

Table 4–___. Urban Water Use Study Data Sources

Water Use
Survey of Public Water System Statistics, California Department of Water Resources
Urban water management plans
Regional and local water agency reports on water use and conservation
Socioeconomic
Census of Population and Housing, U.S. Department of Commerce
Survey of Current Business, U.S. Department of Commerce
Statistical Abstract of the United States, U.S. Department of Commerce
California Statistical Abstract, California Department of Finance
California Population Characteristics, Center for Continuing Study of the California Economy
Population Projects by Race and Ethnicity for California and its Counties 1990–2040, California Department of Finance
Regional and local planning agencies

Model input for market penetration and water use reduction assumptions for water conservation measures were taken from the *Memorandum of Understanding Regarding Urban Water Conservation in California*, and federal and state plumbing fixture standards. The urban MOU was drafted by the California Urban Water Conservation Council to speed implementation of BMPs and to estimate the market penetration and consumption reduction factors for certain BMPs. These estimates were adopted as the default basis of water savings calculations in the Urban Water Use Study. More detail on the urban MOU is contained in the discussion of water conservation in this chapter.

The primary objective of the Urban Water Use Study is to estimate the percentage change in per capita water use in each hydrologic region by 2020. Urban water use forecasts were conducted for representative water service areas within each region. The results of the individual model runs were combined to estimate 2020 level per capita water use by hydrologic region (Table 4–___). The forecast projects that statewide per capita water use will decline by about 10 percent by 2020. The difference between the 1995 and 2020 levels reflect the influence of water conservation measures and socioeconomic change on per capita water use in each region.

The study results were used to estimate year 2020 urban applied water. The projected change in per capita water use in each region, expressed as a percentage, was applied to the 1995 level per–capita water use for each DAU to estimate the 2020 level per capita water use. The 2020 level per–capita water use then was multiplied by the population forecast to compute 2020 urban applied water use for each DAU. These results were aggregated to compute the 2020 level urban applied water use by hydrologic region and statewide.

Table 4–___. Per Capita Water Use by Hydrologic Region, 1995 and 2020

(in gallons per day)

Region	1995 Base	2020 Forecast	% Change
North Coast	255	229	10
San Francisco Bay	177	169	4.5
Central Coast	180	164	8.9
South Coast	208	186	8.2
Sacramento River	274	257	6.2
San Joaquin River	301	269	10.7
Tulare Lake	311	274	11.9
North Lahonton	409	347	15.2
South Lahonton	284	262	7.8
Colorado River	578	522	9.7
Statewide	224	203	9.4

Urban Water Demands

[Table and text have not yet been generated.]

Table 4–____. Statewide Urban Water Demands